O-ring against conduit connections having both the single O-ring and a nitrile coated aluminum gasket having a combined embossment and the formed pilot as shown in FIGS. 7 through 9. At 127° C. the single O-ring samples averaged 9.7 g/yr, while the gasket/O-ring samples averaged 2.0 g/yr—for a reduction of 79%. At 100° C. the single O-ring samples averaged 2.7 g/yr, while the gasket/O-ring samples averaged 0.0 g/yr—for a leak rate reduction of 100%.

Accordingly, a comparison of the two tests yields the following analysis. At 127° C. the prior art gasket samples averaged 4.2 g/yr, while the novel gasket samples averaged 2.0 g/yr—for a reduction of 52%. At 100° C. the prior art gasket samples averaged 0.6 g/yr, while the novel gasket samples averaged 0.0 g/yr—for a leak rate reduction of 100%. Therefore, with regard to relative leak rate performance, the novel gasket performs at least twice as well as the prior art gasket.

Another significant advantage of the present invention is that the formed pilot on the gasket has a centering effect on the assembly, thereby minimizing leakage due to O-ring compression variation. During assembly, the tapered portion of the formed pilot pilots to the chamfer of the receiver to enable the tube to self-align to the receiver, thereby reducing the risk of degradation and under-compression of the O-ring. This self-aligning action also constrains and centers the tube within the receiver such that the tube is prevented from moving laterally within the receiver. Preventing lateral movement of the tube prevents side-loading the O-rings and leads to a more even compressive load upon the O-rings within the passage of the receiver.

While the invention has been described in terms of a preferred embodiment, it is apparent that other forms could be adopted by one skilled in the art. Accordingly, the scope of the present invention is to be limited only by the following claims.

What is claimed is:

1. A fluid-tight conduit connection, comprising:

a conduit;

an end-form block having a conduit passage therethrough through which said conduit is entrapped;

a planar seal having a formed pilot thereon with an aperture therethrough through which said conduit is fitted, said planar seal having a periphery;

a receiver having a fluid passage therethrough into which said conduit is fitted, said planar seal being compressed between said receiver and said end-form block for establishing a primary seal, and said formed pilot extending into said receiver and being sandwiched between said conduit and said fluid passage to establish a secondary seal; and

means for fastening said end-form block to said receiver such that said planar seal is further compressed to complete said fluid-tight conduit connection.

2. The fluid-tight conduit connection of claim 1, wherein said planar seal comprises:

a substrate with opposite surfaces and a circumferential edge therearound; and

a rubber coating on each of said opposite surfaces of said substrate, whereby said circumferential edge of said substrate remains exposed.

3. The fluid-tight conduit connection of claim 2, wherein said planar seal further comprises:

an embossment surrounding said aperture and following said periphery of said planar seal to establish a pre-seal during assembly of said fluid-tight conduit connection.

4. The fluid-tight conduit connection of claim 2, wherein said substrate is composed of aluminum, and said rubber coating is composed of nitrile material.

5. The fluid-tight conduit connection of claim 1, wherein said means for fastening includes a fastener passing through said end-form block and threaded into said receiver.

6. The fluid-tight conduit connection of claim 5, wherein said fastener comprises:

a stud passing through said end-form block and threaded into said receiver; and

a fastening nut threading onto said stud, said fastening nut being torqued against said end-form block.

7. The fluid-tight conduit connection of claim 6, wherein said fastening nut has a conical washer portion overhanging said end-form block.

8. A fluid-tight conduit connection, comprising:

a conduit having an end, an upset bead adjacent said end, and a circumferential groove therebetween;

a circumferential seal mounting over said end and in said circumferential groove of said conduit;

an end-form block having a fastening surface, a sealing surface, and a conduit passage therebetween, said conduit passage having a counterbore in said sealing surface through which said conduit extends and in which said upset bead of said conduit is entrapped;

a planar seal having a formed pilot thereon with an aperture therethrough through which said end of said conduit passes, said planar seal having a periphery;

a receiver having a fluid passage therethrough into which said end of said conduit is fitted, said circumferential seal being compressed by said fluid passage to establish a first primary seal, said planar seal being compressed between said end-form block and said receiver to establish a second primary seal, and said formed pilot extending into said receiver and being sandwiched between said conduit and said fluid passage to establish a secondary seal; and

means for fastening said end-form block to said receiver, said fastening means mounting to said end-form block and said receiver such that said planar seal is further compressed to complete said fluid-tight conduit connection.

9. The fluid-tight conduit connection of claim 8, wherein said planar seal comprises:

a substrate having opposite surfaces and a circumferential edge therearound; and

a rubber coating on each of said opposite surfaces of said substrate, whereby said circumferential edge of said substrate remains exposed.

10. The fluid-tight conduit connection of claim 9, wherein said planar seal further comprises:

an embossment surrounding said aperture and following said periphery of said planar seal to establish a pre-seal during assembly of said fluid-tight conduit connection.

11. The fluid-tight conduit connection of claim 8, wherein said upset bead of said conduit is mounted flush with said sealing surface of said end-form block within a positive unilateral tolerance to create a pinch point on said planar seal to ensure planar sealing.

12. The fluid-tight conduit connection of claim 11, wherein said counterbore of said end-form block has a front chamfer therein to permit excess material from said upset bead of said conduit to flow therein to ensure repeatability of said positive unilateral tolerance.

13. The fluid-tight conduit connection of claim 11, wherein said conduit passage of said end-form block has a

rear chamfer therein to permit excess material from said upset bead of said conduit to flow therein to ensure repeatability of said positive unilateral tolerance, said rear chamfer further permitting said conduit to positively lock to said end-form block to keep said end-form block retained on said conduit during shipping.

14. The fluid-tight conduit connection of claim 11, wherein said conduit passage of said end-form block has axial grooves therethrough to permit escape of fluid pressure during assembly of said conduit to said end-form block.

15. A fluid-tight conduit connection of teardrop shape with a fastener end and a conduit end opposite said fastener end, said fluid-tight conduit connection comprising:

a conduit having an end and a circumferential groove adjacent said end;

a circumferential seal mounted in said circumferential groove of said conduit;

an end-form block having a fastening surface, a sealing surface opposite said fastening surface, and a conduit passage therebetween through which said conduit is entrapped;

a planar seal having a front surface, a rear surface opposite said front surface, an aperture therebetween, and a formed pilot surrounding said aperture, said conduit being fitted through said aperture;

a receiver having a sealing surface with a fluid passage therein into which said conduit is fitted, said circumferential seal being compressed by said fluid passage to establish a first primary seal, said planar seal being compressed between said sealing surface of said end-form block and said sealing surface of said receiver to establish a second primary seal, and said formed pilot extending into said receiver and being sandwiched between said conduit and said fluid passage to establish a secondary seal; and

means for fastening said end-form block to said receiver such that said planar seal is further compressed to complete said fluid-tight conduit connection.

16. The fluid-tight conduit connection of claim 15, wherein said means for fastening includes a fastener passing through said end-form block and threaded into said receiver.

17. The fluid-tight conduit connection of claim 16, wherein said planar seal further has at least one tab at said fastener end, said at least one tab being folded onto said planar seal so as to double the thickness of said planar seal at said fastener end, said at least one tab pre-loading said conduit end so as to balance alignment of said fluid-tight conduit connection during assembly in response to otherwise uneven alignment of said conduit in said fluid passage of said receiver.

18. The fluid-tight conduit connection of claim 16, wherein said planar seal further includes an embossment, said embossment being of greater thickness near said conduit end than said fastener end to establish a pre-seal at said conduit end so as to ensure sealing of said fluid-tight conduit connection during assembly in response to otherwise uneven alignment of said conduit in said fluid passage of said receiver.

19. A planar seal comprising a front surface, a rear surface opposite said front surface, and an aperture therebetween, said planar seal further comprising a peripheral surface, a formed pilot surrounding said aperture and an embossment surrounding said aperture and following said peripheral surface, said formed pilot extending in a direction away from one of said front and rear surfaces, said formed pilot further providing a seal for a connection.

20. A planar seal as claimed in claim 19, further comprising:

a substrate layer having opposing surfaces and a circumferential edge therearound; and

a rubber coating. on each of said opposing surfaces of said substrate layer, whereby said circumferential edge of said substrate layer remains exposed.

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